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A Parasitic Copepod, *Cardiodectes rotundicaudatus* n. sp.,
(Caligoida: Lernaëidae) Obtained from
a Deep-sea Goby in Japan

With 3 Text-figures

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ABSTRACT *Cardiodectes rotundicaudatus* n. sp. described here was found on a deep-sea goby, *Suruga fundicola* J. et S., taken in Sagami Bay. A single female with egg strings was found inserting its head into the host body on the dorso-lateral side near the base of the second dorsal fin. It perforates the muscular layer, its head reaching the vertebral column of the host. The body part outside the host directs towards the tail. This new species is allied to *C. rubosus* Leigh-Sharpe obtained from *Apogon* sp. Known species of the genus *Cardiodectes* inclusive of the present species are divisible into two groups on the basis of their body shapes. The relation between these two groups and their respective hosts is also discussed.

The genus *Cardiodectes* was established by Wilson (1917) to accomodate his species, originally described under the name of *Lernaënicus medusaeus* (1909) and redescribed by Brian (1912), as well as Richiardi's *Peroderma bellottii* (1882) redescribed by Jungersen (1911). It differs from *Lernaënicus* in having a spherical mass of branched processes in the cephalic region in place of hard chitinous horns, and from *Peroderma* in the absence of soft, laminate lateral horns. So far as the present author is aware, it comprises eight species in all. Recently, the ninth species was obtained from a deep-sea goby, *Suruga fundicola* J. et S., in Sagami Bay, Japan. It is based on a single specimen sent from the Biological Laboratory, Imperial Household, to Dr. S. M. Shiino for identification, with which the present author has been entrusted.

Cardiodectes rotundicaudatus n. sp.

Material: One female with egg strings, on *Suruga fundicola* J. et S., off Kadone in Sagami Bay, 110 m deep, by Biological Laboratory, Imperial Household; 15 January, 1956.

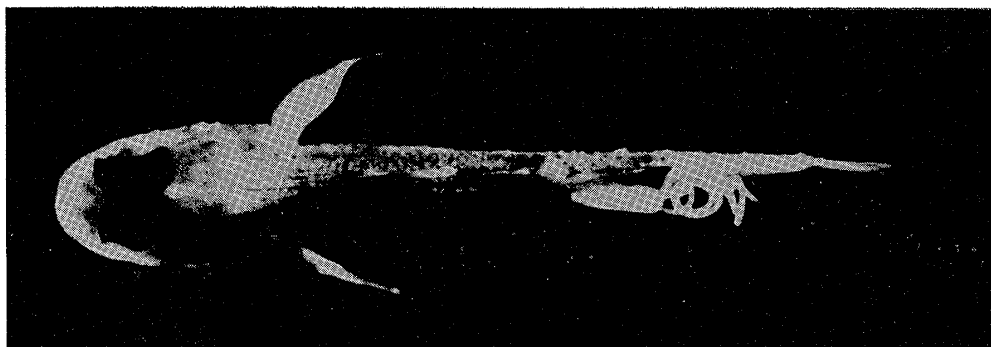


Fig. 1. *Suruga fundicola* J. et S. infected by *Cardiodyctes rotundicaudatus* n. sp. $\times 2.4$

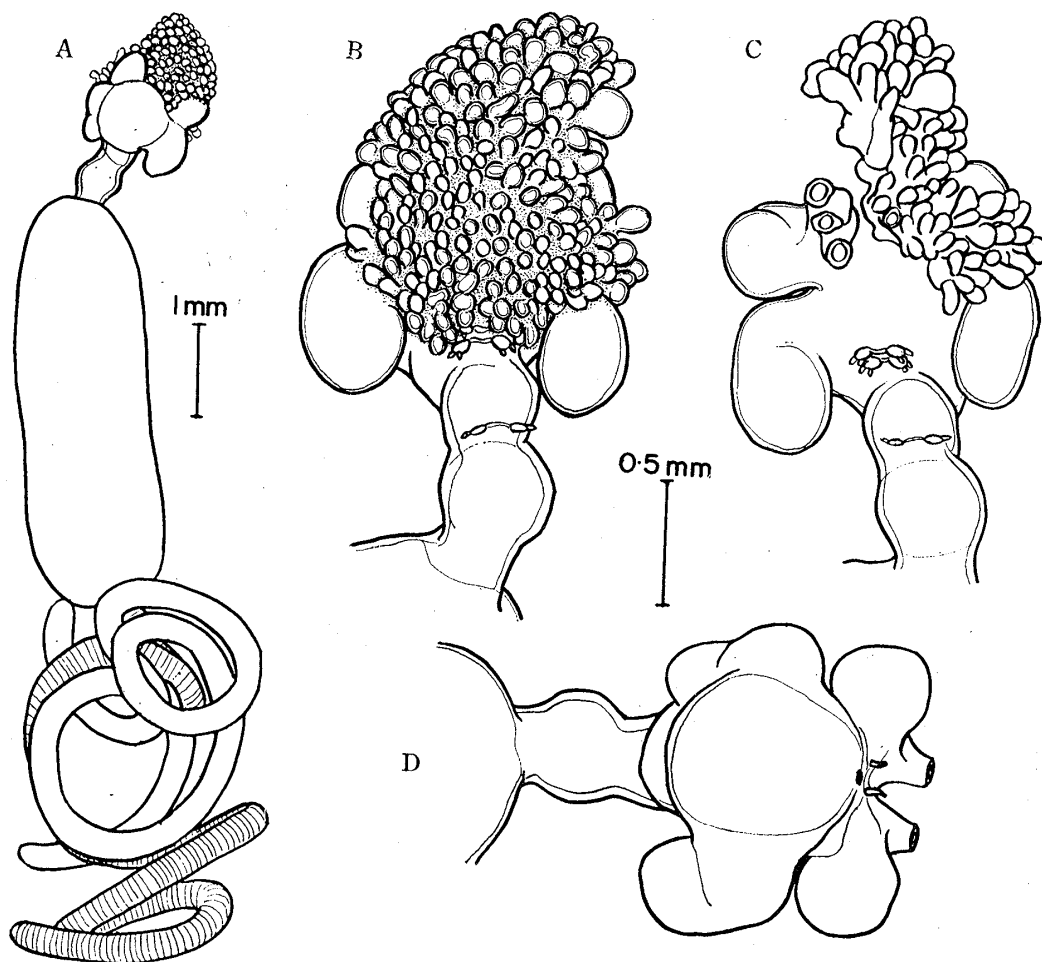


Fig. 2. *Cardiodyctes rotundicaudatus* n. sp. A, female, dorsal view; B, head, ventral view; C, the same, with a part of the frontal processes removed, ventral view; D, the same, with the frontal processes removed, dorsal view.

Habitat: The parasite inserts its neck into the host at dorso-lateral region near the base of the second dorsal fin and perforates the muscular layer of the host so deeply that its head reaches the vertebrae. The head, which is closely surrounded by a cyst-like membrane of host material, has its ventral surface applied to the vertebrae, neural spines and interneural spines. Trunk is left outside the host, trailing its end towards the host tail.

Holotype: Body length except egg strings 6.5 mm, head without frontal processes 1.0 mm \times 1.1 mm, trunk 4.4 mm \times 1.5 mm, length of egg strings ca. 20 mm. Head and neck whitish, trunk whitish yellow, egg strings yellow in alcohol. Body plump; head small, covered with a cauliflower-like mass of frontal processes on anterior and ventral side; neck narrow, relatively short and stout; trunk stumpy with round end; no abdomen; egg strings long and coiled.

Cephalothorax roughly quadrangular due to the presence of two pairs of lateral lobes. Central portion ovate, convex on dorsal surface, flattened on ventral surface. Frontal processes arise from antero-ventral side of cephalothorax with a pair of short, broad bases closely adjoining together on midline. Each of the bases radiates short branches subdivided into numberless branchlets. Lateral lobes arranged antero-posteriorly on either side. Anterior one is a simple round bulge, situated somewhat more ventrally than posterior one, which is much larger, somewhat expanded ventrally and extending backwards beyond cephalothorax. Neck arises from posterior end of cephalothorax and continues to the trunk by abrupt expansion. It is cylindrical, but broadened in the central section to form a bulb one-third as broad as its trunk. The latter is cylindrical, but more or less flattened on its dorsal side, about one-third as broad as long, and ends in a rounded surface, to which egg strings are attached.

Cephalic appendages and eye are covered by frontal processes from above. The first antenna is located on the dorsal surface of the cephalothorax at a short distance behind the bases of the frontal processes, which are very tiny, indistinctly two-jointed, bearing several simple spines. The eye is on a midline slightly dorsal to the first antennal base and buried under hyodermis. The second antenna is cheliform and located on the anterior margin of cephalothorax between the bases of frontal processes. The mouth cone was not examined. Maxilla is found on the ventral surface of cephalothorax at a short distance behind the base of frontal processes, two-jointed; the proximal joint is directed backward and medially, whereas the distal one is turned forward and curved at the tip, forming a hook.

Three pairs of legs are discovered. The first two pairs are close to each other, located on posterior portion of cephalothorax, and partially covered by the frontal processes. They are biramous and similar to each other in size and structure. Protopodite and both rami are two-jointed and armed with spines. The third pair of legs are uniramous and located on the neck just in front of its bulb-like expansion. Legs in all pairs are connected together with sternal plate.

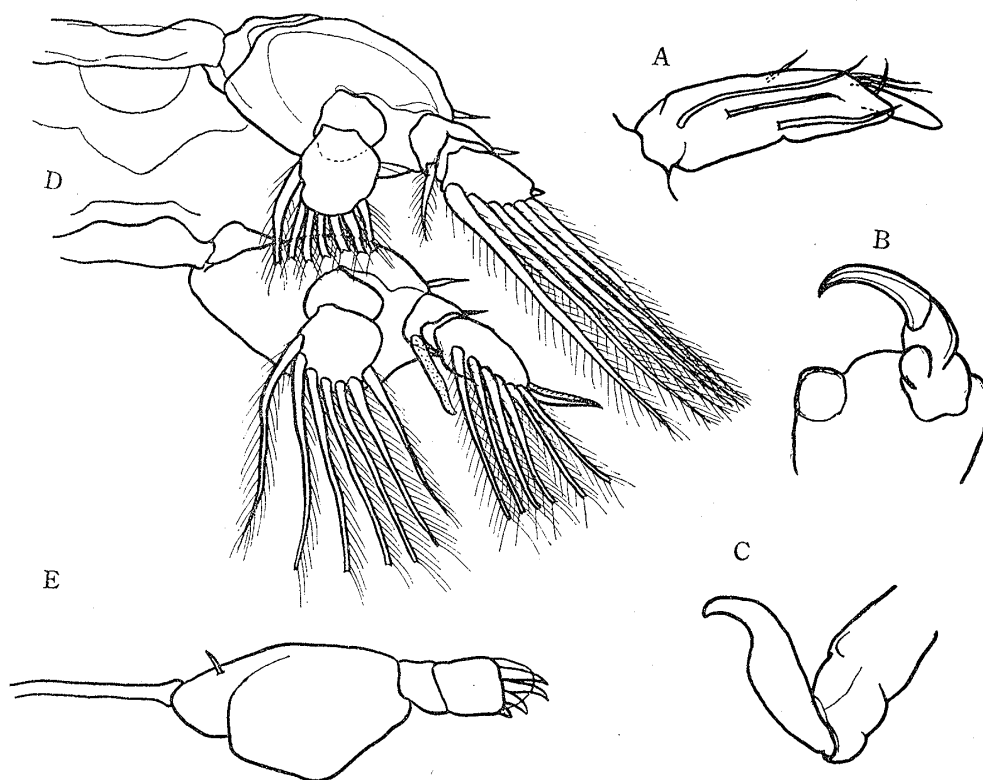


Fig. 3. *Cardiodesmus rotundicatudatus* n. sp. A, first antenna; B, second antenna; C, maxilla; D, first and second legs in situ; E, third leg. A-E $\times 475$.

The holotype is to be deposited in the Biological Laboratory, Imperial Household, Tōkyō.

DISCUSSION

This new species somewhat resembles *C. rubosus* described by Leigh-Sharp (1934, p. 38, Fig. 35) from *Apogon* sp. in Salmon Islands in general appearance. Judging from Leigh-Sharp's figure on *C. rubosus* the two species differ in some points. In *C. rubosus*, the frontal processes are not so well developed as to cover the ventral surface of the cephalothorax, the lateral lobes having irregular ventral bulges, and the first two pairs of legs located in the middle of the cephalothorax, and also the maximum width of the latter is larger than that of the trunk, which has two small processes at the hind end.

Eight known species and the new one can be assorted into two groups according to their body shape. The assignment of them to the two groups and their hosts recorded by the respective authors are shown in Table 1.

Six species of the "medusaeus" group have the following common characteristics: The neck is relatively long, and insensibly passes into a slender trunk which terminates in a short and blunt knob that may represent the abdomen. The body

Table 1
Species and two groups of *Cardiodectes* Wilson with
their host fishes recorded

Parasites	Hosts
"medusaeus" group	
<i>C. medusaeus</i>	Wilson, 1908; <i>Nannobrachium leucopsarum</i> , (Myctophidae): Brian, 1912; <i>Myctophum affine</i> , (M.): Wilson, 1917; <i>Nannobrachium leucopsarum</i> , <i>leucopsarum</i> , <i>Diaphus glanduliferus</i> , (M.): Kirtisinghe, 1950; <i>Thrissa hamiltoni</i> , (Engraulidae): Shiino, 1958; <i>Diaphus glandulifer</i> , (M.): Ho, 1966; <i>Lampanyctus leucopsarum</i> , (M.)
<i>C. bellottii</i>	Richiardi, 1882; <i>Scopelus benoiti</i> , (M.): Brian, 1906; <i>Scopelus benoiti</i> , <i>S. caudispinosus</i> , (M.): Jungersen, 1911; <i>Scopelus glacialis</i> , <i>S. rafinesquii</i> , (M.): Wilson, 1917; <i>Scopelus glacialis</i> , (M.): Capart, 1953; <i>Myctophum sp.</i> , (M.)
<i>C. anchorellae</i>	Brian et Gray, 1928; <i>Anchoviella tri</i> , (E.): Gnanamuthu, 1951; <i>Stolephorus indicus</i> , (E.)
<i>C. frondosus</i>	Schuurmans-Stekhoven, 1937; <i>Myctophum spinosum</i> , (M.)
<i>C. cristatus</i>	Shiino, 1958; <i>Diaphus glandulifer</i> , (M.)
<i>C. longicervicus</i>	Shiino, 1958; <i>Dasyscopelus asperum</i> , (M.)
"rubosus" group	
<i>C. rubosus</i>	Leigh-Sharpe, 1934; <i>Apogon sp.</i> , (Apogonidae)
<i>C. hardenbergi</i>	Markewitsch, 1936; <i>Stolephorus heterobus</i> , (E.)
<i>C. rotundicaudatus</i>	present author; <i>Suruga fundicola</i> , (Gobiidae)

Their hosts are limited to the fishes belonging to Engraulidae and Myctophidae, or Isospondylous and Iniomus fishes. Three species of the "rubosus" group share the following characters: The neck is short and abruptly widens to continue to a stumpy trunk with a round end. There is no abdomen. The body length is relatively smaller than in the first group ranging 4 mm–6.5 mm. Hosts of the "rubosus" group belong to Engraulidae, Gobiidae and Apogonidae, of which the latter two are referred to Percida or Acanthopteri. It is interesting to note that those two groups are different not only in external characteristics, but also in their host families; that is, the hosts of the "medusaeus" group are limited to the primitive Teleostei, mainly to Myctophid fishes (rarely Engraulids), while those of "rubosus" vary from primitive Teleostei, Engraulid fishes, to higher Teleostei.

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length is relatively larger than in the other group, falling within 5.5 mm–12 mm.

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REFERENCES

- Brian, A., 1912. Res. Camp. Sci. Monaco, **38**, 1.
- Brian, A. and P. Gray, 1928. Boll. Mus. Zool. Anat. Comp. U. Genova, **8**, 1.
- Capat, A., 1953. Bull. Inst. franc. Afr. Noire, **15**, 647.
- Gnanamuthu, C. P., 1951. Proc. Zool. Soc. London, **121**, 237.
- Ho, J.-S., 1966. Bull. Mar. Sci., **16**, 159.
- Jungersen, H. F. E., 1911. Vidensk. Medd. dansk. naturh. Foren., **64**, 1.
- Kirtisinghe, P., 1950. Parasit., **40**, 77.
- Leigh-Sharpe, W. H., 1934. Siboga-Exped., **29b**, 1.
- Markewitsch, A. P., 1936. Treubia, **15**, 407.
- Richiardi, S., 1882. Zool. Anz., **5**, 475.
- Schuermans-Stekhoven, H. J., 1937. Mem. Mus. Roy. Hist. Nat. Belg., **9**, 11.
- Shiino, S. M., 1958. Rep. Fac. Fish. Pref. U. Mie, **3**, 75.
- Wilson, C. B., 1908. Proc. U. S. Nat. Mus., **35**, 431.
- , 1917. *ibid.*, **53**, 1.